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Cinematographer

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The Magazine of Motion Picture Photography



In This Issue:

- Exposure Accuracy With Magic-eye Camera
- Photographing "Last Train From Gun Hill"
- Gyro Stabilizer For Hand-held Cameras
- Color In Motion Pictures And TV

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Cinematographer

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* In This Issue

COLOR IN MOTION PICTURES AND TV

Part I: The three-color theory—By Robert Allen Marshall 342

PHOTOGRAPHING "LAST TRAIN FROM GUN HILL"

Carefully selected camera angle + mark photography
by Charles Lang, Jr., A.S.C.—By Mark A. Lippman 344

MOTION PICTURE CAMERAS THE AMERICAN CONFERENCE

The camera that has become an important tool for
many professional cinematographers 348

HOMEMADE FILM RIN

Ideal for easing task of editing 16mm film—By George J. Yarbrough 350

ELECTRICAL TRIPPING MECHANISM FOR SOUND MIXING

Simplifies use of tape recorder for budget film makers—By
Ronald W. Moore 352

ALL WEATHER CAMERAMAN

Cinematographer Vincent Hunter turns inclement weather
to his advantage—By Clifford V. Harrington 355

EXPOSURE ACCURACY WITH BUSH-EYE CAMERAS

Progress report on new developments in automatic exposure control
for cine cameras—By Dan Newman 356

STABILIZER FOR HAND-HELD CAMERAS

Gives absolute camera smoother, steadier shots—By Joseph V. Meserik 358

* Features

INDUSTRY NEWS

News briefs of industry activities and progress 318

PHOTOGRAPHIC ASSIGNMENTS

Where and what TV and feature film cameramen were
shooting last month 328

WHAT'S NEW IN EQUIPMENT, ACCESSORIES, SERVICES

Things that are new for makers of motion pictures 332

TECHNICAL QUESTIONS AND ANSWERS

Reader's questions answered by experts 334

ON THE COVER

PHOTOGRAPHING A SCENE in Rome for *Pan Hu* with the M. G. M. (Photovision) 35 Camera. Directing the photography is Robert Swiken, A.S.C. (top right) while watching the action (seen reflected in the camera view box's glass panel) is Director William Wyler.

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Precision Test firing of Rocket Engine at Rocketdyne's Propulsion Field Laboratory is recorded by Mitchell Camera in remote 3600 acre test area in Santa Susana Mountains, California.



Scene from "Road to the Stars," which was the top award in the Industry Film Producers Association competition, shows camera unit at plant with Mitchell on track-mounted dolly. Producer-Director was Bill Adams.



Camera requires great flexibility from long range to close-ups like that which shows the Mitchell shooting a precise view of great operators in the recording center during a test.

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INDUSTRY NEWS



BEHIND THE FILM making is reflected in *My Son John*. Here cinematographer Walter Stange, A.S.C. (center, takes light meter reading before starting camera on a family film religious production in rehearsal.

Family Films, Hollywood, last month completed the 200th episode in the TV film series, "This Is The Life". Family Films, headed by Sam Hersh, entered the religious film field only ten years ago. Today, the company is among the leaders in religious film production, having produced TV film series for the Lutheran, Southern Baptist and Methodist churches.

"This Is The Life" is televised by more than 320 stations weekly in the U.S., Canada, Alaska, Hawaii, Puerto Rico, and Australia, and ranks among the world's most televised programs.

Numerous awards have been presented to the program, including three from the Freedom Foundation for contribution to the spiritual and moral uplift of the nation. It has also received a Billboard award for the best thirty-minute filmed religious program on the air.

Each segment of "This Is The Life" is produced and photographed in the Family Films' studio with the same infinite care and production quality that is customarily given major theatrical films.

Director of photography Walter Stange, A.S.C., has photographed most of the series as well as most of the religious TV films produced by Family Films for other churches.

Distribution in the United States, of Arriflex IIIBs and Xenon cameras as

News Briefs of
industry activities,
products and progress

well as other Arriflex products was transferred by Kling Photo Corporation on July 1st to the newly-formed Arriflex Corporation of America, 257 Park Ave., New York 10, N. Y. Formation of the new corporation, according to Paul Klingenstein, president, will permit greater concentration on Arriflex sales and service and form the base for future developments.

"The Son of God," depicting the entire life of Jesus from the Annunciation through the Ascension will roll in November and will cost \$30,000,000, according to Lord Malcolm Douglas-Hamilton, President of Parliament Pictures Corp., New York, which will produce it.

Said to be the highest cost motion picture of all time, it will have a cast of 50,000 and 150 principal parts. It may also be produced in a new 3-D process of research and development on a new stereo system, and not to require special viewing glasses or other viewing aids can be completed in time by Vienna scientist, Charles Langberg.

Cinemagic is tag of newest "gimmick" for movie presentation, which will be used for first time for the Sid Pink production, "Invasion of Mars," which will roll soon at Hal Roach studios before the cameras of Stanley Cortez, A.S.C.

Process, developed by Norman Marent, can be utilized with any size negative, according to Pink, who explains that process can transform a live action film image to resemble a line drawing, as in animation by optical methods. Just how, Pink refused to divulge in recent Hollywood press conference.

According to industry trade paper *Hollywood Reporter*, "The image is tracked up, after normal photography, with optical and chemical treatments and adjusting; this gimmicking is done to the negative after exposure."

Continued on page 322



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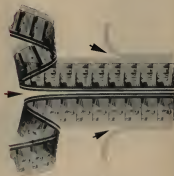
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35 32



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Additional information to help you apply these advantages to your own film needs is available on request. Ask for Bulletin G.*

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*Presented October 6, 1958 at SMPTE Convention at Los Angeles by William E. Gayhart, Jr., N.P., of General Film Laboratories Corp.



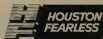
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INDUSTRY NEWS

Continued from page 518

An electronic switching device which makes possible instantaneous switching from film to tape without the reflexor or picture breakup that has characterized such switching heretofore, has been perfected by AEC-TV engineers. Device locks the individual synchronizations of the film and tape signals so they remain in sync throughout the program's broadcast interval. It is understood that some sync lockup can also be effected between segments of film programs, so that tape and film can be integrated in the same program.

Two stock model 8mm electric eye cameras under trial in a laboratory at Bell & Howell, Chicago, have proved that the cameras' automatic exposure controls would, with average usage, last at least 3,750 years—or until 5796 A.D. Estimate is based on camera user shooting an average of 50 rolls of film per year in rapidly changing light conditions.

Laboratory trials began early in August, 1957, have exposed the electric-eye units to an intermittently flashing light placed inches away. The blinking light operates around the clock at one-second intervals and causes the photoelectric cell in the electric-eye mechanism to adjust the camera lens openings 15,000 times a day.

To date, after more than 7,500,000 cycles, the electric eyes have outlined four light bulbs, an electronic counter which records each flash, and an electronic tube used to turn off the counter if the light fails.

"We need instant commercials, any more than we need instant ideas, instant print ads, instant creativity, instant art!"

Question was posed recently by Robert L. Lawrence, one of the top TV commercial producers in New York, who has come out strongly against the use of videotape for TV commercials—"for at least another year," He said that V-tape cannot match film's unlimited technological capacities in editing, in animation nor in use of opticals. "To say that tape is cheaper than film is to compare peeps with lemons," he concluded. ■

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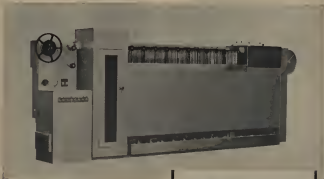


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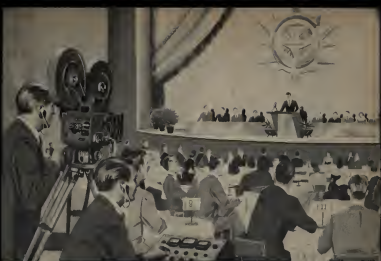
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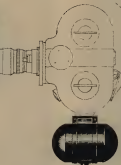
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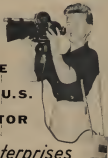
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PHOTOGRAPHIC ASSIGNMENTS

WHAT THE INDUSTRY'S CAMERAMEN WERE SHOOTING LAST MONTH

ATTRIBUTES INDICATE TELEVISION FILMS

AMCO STUDIOS

ALAN SCHWARTZ, ASC, "Police Station" (Congressional Investigator)* (Standby News and Photo.) Sandy Howard, director

AMERICAN NATIONAL

WILLIAM WHITLEY, ASC, "Spain" (Zu-TV) with Bill Landings

CHUCK FITZGER, "Lickup" (Zu-TV) with MacDonald Corey Hertz, director

YVESKIN ARKIN, CLYD FITZGER, "Challenge" (Zu-TV) with George Nader

BOB HORTMAN, ROBERT BEVINS, "Bat Nation" (Zu-TV) with Gene Barry

LARRY BONES, "See Short" (underwater photography, Zu-TV) Leon Remon, director

YVESKIN ARKIN, "Baroque" (Zu-TV) with Keith Andes

BOB HORTMAN, "Tenderness" (Zu-TV) Rebecca Hoffman, director; Commercial

CALIFORNIA STUDIOS

YVESKIN LEWIS, "Vary Industrial Film" (Roland Reed Photo Shooting in NY) Arthur Pennon, director

NICK NICHOLAS, ASC, "The Legend" with Walter Anderson and Tom Tully

SEYMOUR THOMPSON, ASC, "Hase Gun, Will Travel" with Richard Boone and Kim Tong

FRANK SCHWARTZ, "Comanche" with James Arness and Dennis Weaver

CASCADE PICTURES

ELWOOD BRIDELL, ASC, "Comanche" (Roy Schwartz, Commercial)

COLUMBIA

GARY ANDERSON, ASC, "Dance Reed Show" (Screen Gems) with Donna Reed Oscar Rudolph, director

OWEN MONTGOMERY, "One Man in Havana" (Krugman Prod.) (Screen Gems) shooting in Havana with Alec Guinness and Mercedes d'Almeida, Carol Reed, director

JAMES WOOD HOWE, ASC, "The Free Last Story" (Globe Phot.) shooting in Vietnam with Dick Bogarde and Capucine, George Oakes, director

PAUL GARRETT, ASC, "Father Knows Best" (Screen Gems) with Robert Young and Jane Wyatt, Peter Teckler, director

JOVING LIPMAN, "Tightrope" (Screen Gems) with Michael Gough

JACK HILDEMAN, "Saddles, Last Summer" (Sam Spiegel Prod.) shooting in London with Elizabeth Taylor and Montgomery Clift, Joseph Mankiewicz, director

CHARLES WALLACE, "Machete" (Screen Gems) with Victor Jerry and Patrick McVey, Fred Jackson, Jr., director

HERBY FREEDMAN, ASC, "Dances the Menace" (Screen Gems) with Gloria Henry & Herbert Anderson, Wm. Russell, director; Commercial

JACK EMMA, "Shakedown" (Screen Gems) shooting in Fla. with Walter Mathen, Herman Jaffe, director

PERNITT GERTY, ASC, "Mountain Road" (Whitcomb) with James Stewart, David Mear, director

WILLIAM COOPER, "Gallant's Trench" (U-M Magazine World Wide, S.A., shooting in Spain) with Kerwin Matthews and Jo Meehan, Jack Sher, director

CHARLES LAWTON JR., ASC, "The Gene Kings Story" (Philip A. Weisman Prod.) with Sal Mineo and Susan Archer, Dan Woot, director

HARRY STRANING, ASC, "Who Was That Lady?" (Amarck Solary Prod.) with Tony Curtis and Dean Martin, George Sidney, director

WILLIAM CLINE, ASC, "Dances the Young" (Dorval Film) with Dick Clark and Michael Caine, Paul Wendler, director

PHILIP TOWNSEND, ASC, "Man from Blackhawk" (Alcoa Theatre, Screen Gems) with Robert Rockwell

GARY ANDERSON, ASC, "Philip Taylor, ASC, "Walking Cloud" (Alcoa Good year Theatre) (Screen Gems)

DELMO STUDIOS—Culver City

KENNETH PEACH, ASC, "Lennie" (Jack Weather Prod.) with Jess Lockhart and John France

ROBERT HAYMAN, "Wyatt Earp" (Donda Prod.) with Hugh O'Brian

PALL IRANO, "The Tenth" (Donda Prod.) with Ray Collins

CHARLES YEN ENGER, ASC, "Betsy Heine Show" (Donda Prod.) with Betty Heine, Richard Kason, director

WALTER SCHWARTZ, ASC, Commercial

DELMO STUDIOS—Denver

ROBERT FITZGER, ASC, "Ann Sefton Show" (Donda Prod.) with Ann Sefton

CHARLES STRANING, "Whispering" (Donda Prod.) with Ken Toley and Craig Hill

DELMO STUDIOS—Hollywood

ROBERT DE GRANGE, ASC, "Dance Theatre Show" (Donda Prod.) with Danny Thomas, Sheldon Leonard, director

WALTER SCHWARTZ, ASC, Commercial

DUNN STUDIOS

RONNIE ERLAN, ASC, "Polyanna" (Shooting in New York) with Jane Fonda and Richard Egan, David Swift, director

WILLIAM SYLVAN, ASC, "Texas John Slaughter" with Tom Tryon and Betty Lynn, Harry Keller, director

WALTER LAWLEY, ASC, "The Little League" Walter Brundage, director

FOR WESTERN AVENUE

JAMES VAN DYKE, ASC, "The Merry Lovers of Delon Gals" with Dwayne Hickman, Red Amadio, director

ELWOOD ARBER, ASC, "How to Marry a Millionaire" with Richard Eden, Jerry Andrus and Lani Gape, Danny Dorf, director

GENERAL SERVICE

MICHAEL NICHOLAS, "Rushier Patrol" (Globe Photo) with Richard Webb, Sam Galla, director

GOLDWYN STUDIOS

NORMAN BRONSON, ASC, "Lovingly Yours" (Lewin Prod.) with Loretta Young

INDEPENDENT

BONNIE KALLENBERG, ASC, "The Fugitive Kind" (Jagor-Sherpherd Prod. for UA) shooting in NY with Marlon Brando and Anna Magnani, Sidney Lumet, director

JAMES SCHILLER, ASC, "Mondo Test Project" (BFA African Movie Range, Cape Canaveral, Fla)

MICHAEL HARTMAN, "Dinner" (Kremer-shooting in NY) with Ed Burns and James Brinkley, Gerald Mayer and Herman Hoffman, director

KEYWEST STUDIOS

WALTER STRANING, ASC, Series of religious pictures (Family Film) William Chetani, director

KITV STUDIOS

JACK MARTIN, "Breeze 5" (Columbia Co.) with Jan Davis and Lang Jeffries, Robert Walker, director

LEWISSTON PLAZAHOUSE

ALAN SCHWARTZ, ASC, "People Are Funny" Herb Alton, director

METRO-GOLDWYN-MAYER

GEORGE CLARK, ASC, "Twilight Zone" (CBS)

JERRY NICHOLAS, "Kewade" (CBS-TV) with Eric Fleming and Clint Eastwood

PAUL VOGEL, ASC, "The Gunter" with Glenn Ford and Debbie Reynolds, George Marshall, director

JAMES RUTENBERG, ASC, "Philo Dill" (The Dill Show) (Lewin Prod.) with David Gray and David Soren, Charles Walcott, director

ELLEN CARTER, ASC, "Peter Game" (Spartan Prod.) with Craig Stevens and Lola Albright

WILLIAM MARSHALL, "Not for Hire" (Gall, National Prod.) with Ralph Meeker

DALE DRYDEN, "One Day Beyond" with John Newland

WILLIAM SYLVAN, "Fisher McGee and Molly" (NBC-TV) with Bob Sweeney and Cilly Lewis

N.B.C.

ALAN SCHWARTZ, ASC, "You Bet Your Life" with Groucho Marx, Bob Diner and Bruce Smith, director

PARAMOUNT

DONALD FAFF, ASC, "L'il Abner" (Technicolor) with Peter Fulkner, Sherry Kays and John Newsum, Melvin Frank, director

Continued on Page 573

Serving the World's Finest Film Makers

in the Florida Everglades

ON LOCATION



Director of Photography Jack Elia

The TV series "Statehood"

The star: Walter Matthau
The director: Harmon Jones
The producer: Ben Berezberg
Production mgr: Hal Schuffel
Director of Photography: Jack Elia
Camera operator: Howard Winer
Ass't Camera: George Salano
Sound engineer: Willard Goodman
Gaffer: Arty Maher

The Mitchell NC has just been set up on a parallel in the middle of a swamp.

The actors have just finished rehearsing a grunting hand-to-hand fight in the water, now they've changed to dry clothes for the take.

The director calls, "Roll sound!" the sound engineer yells, "Speed!" Jack Elia says, "Camera!"

This is the magical moment...

The camera switch is pressed, the entire company freezes in position...holding their breath...and the camera starts. The film rolls smoothly thru.

Stops...then "Action"...and before long another scene in "Statehood" is in the can.

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WHAT'S NEW

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Light-weight Animator

Bovile Engineering, 1507 N. Kingsley Dr., Los Angeles 27, Calif., announces a new, lightweight table model animation stand that will handle a wide variety of animation work, special effects, titles, and film strip production. Unit features isolated vertical drive and an exclusive self-adjusting electric platen. Other features include precision high-speed calibration system, special camera mount with full drift compensation, adjustable tracking pantograph, photographic light and argon backlight. A full line of accessories is also available.



Ultra Tele Lens

Sterling-Howard Corp., 561 East Tremont Ave., New York 52, N.Y., is distributor for Astragor long-distance telephoto lenses and supports. Lens, available in 880mm f/5.0 and 1000mm f/6.3, features coated elements, diaphragm stops to f/22, built-in interchangeable filter slot with haze filter,

25-power optical focusing magnifier, and focusing wheel. Mount is sturdily constructed of dural, corrosion-proof aluminum alloy. Prices start at \$495.

Tripod Head

A large size Vidicon camera pan and tilt head ideally suited for use with many motion picture cameras is offered by Camera Equipment Co., Inc., New York, N.Y. Built-in counterbalance readily equalizes weight of cam-



era, allowing operator to pan and tilt smoothly. Features include pan locking lever affording variable tension control, massive tillock, 3/4" camera tie-down screw and large paring handle with rubber grip. Construction is cast aluminum and stainless steel, with grey crackle finish.

Unit is recommended for use with all American cameras, 16mm and 35mm Arriflex, Mitchell 16 and Mauter 16. List price is \$425.00.

Utilized Synchronizers

Precision Laboratories, 1017 Ulrica Ave., Brooklyn 3, N.Y., announces a new line of utilized, add-on-type, film synchronizers which enables users to increase in film handling capacity by simply adding additional units. Add-on film sprocket assemblies are available for both 16mm and 35mm film and feature precision ball-bearings and oilless bearings throughout, dual



tension rollers, finger-tip release, convenient handwheel, individual frame movement—shaft slip lock, and simple coupling method for unitized assem. Also, Combination synchronizers are also available.


460-volt Cineiron

A color temperature control unit with 460-volt input is announced by Formax Films, Cineiron Division, 1802 LaPorte Ave., Ft. Collins, Colo. New unit will also take 230-volt current and is equipped with six 90-amp. rated output receptacles and six-position filament selector switches.

Three-amp. circuit breakers are used on all outlets with a 90 amp. breaker on the 230-V input and 50 amp. breaker on 160-V input. Two accessory 115-V grounded receptacles have 15 amp. mini-breakers for operating cameras or other equipment. Two G-E meters indicate line draw and input voltage. A Simpson Kels-



erator meter shows actual color temperature values of any of the six power outlets, and selector switches permit balancing or blending of light clusters at any temperature up to 3400° K.



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TECHNICAL QUESTIONS & ANSWERS

Conducted by Walter Streng, A.S.C.



QUESTIONS relating to cinematography or other phases of film production are invited from readers and will be answered by letter by Walter Streng or by other qualified members of the American Society of Cinematographers. Questions and answers considered of general interest will appear in this column.—Ed.

Q When looking through the "through-the-lens" views of the Mitchell BNC camera, I observe a hairline scribbled on the extreme right of the groundglass, also—in the corner —a rectangle of smaller size with rounded corners covered by crosshairs. Is the hairline scribbled on the right to indicate the area that will be occupied by the sound track in the print? It is in the entire ground glass area the "Academy" aperture, and the area left of the vertical hairline the projection aperture? And is the area with the rounded corners the so-called "TV frame"?—P. R. N., Washington, D.C.

Answer: It is difficult to give you a definite answer to your compound question because your description of the groundglass scribbles suggests a scribble other than what is normal for BNC cameras. Practically none, if not all, groundglass patterns are as follows: the regular full-aperture area is opaque and the groundglass is ruled to represent the standard accepted Academy aperture, which is 825" by .600". It is no longer the practice to scribe the soundtrack area on the groundglass. Actually, there is a greater picture area exposed on the negative than is indicated by the scribbles; then, in printing, allowance is made for the soundtrack.

The so-called "TV frame"—when such is provided—is scribbled within the area of the Academy aperture on the groundglass. There are various dimensional standards for this among the most common being 716" by .517". It is considered good practice, how-

ever, that the area outside this dimension be kept clear of all interfering marks.

In answer to the "rounded corners" question: this seems to be an optional whim to satisfy a visual pattern. Most groundglass corners are square.—Edmund Fredrick, A.S.C.

Q I am about to tackle for the first time the preparation of A & B rolls for printing. I have the following equipment for this work:

1. Three-gang 16mm synchronizer with footage and frame counters.
 2. B&H 16mm Filmation editor with 2,600 ft. reels and reels and provision for adapting this unit to handle three or more reels on one stand.
 3. B&H 16mm film splitter that makes cut on the frame line.
 4. A 16mm optical sound reader.
- Is there any additional equipment I should have? I understood that original Kodachrome A&B rolls should be marked for effects, etc., with Kana-Kleen labels. Where can I get them?—R. K., Seattle, Washington

Answer: You have basically the right equipment. Things you might add are cotton gloves, scissors and possibly a stylus marking device for indicating on film where splicing is to be done after matching is completed. Any additional equipment you may need, including the marking labels, can be purchased from most of the larger camera stores. Ted Fogelson, A.S.C. Associate

Q I have a Cine Special II with 25mm and a 15mm lenses. I would like to produce a horizontal distortion effect similar to that achieved by the photographer Wegge in his short film on New York. If this effect was achieved with a wide-angle lens and a distortion mirror, how would one achieve correct illumination and focusing on such a mirror? Can you suggest a simpler way to achieve the distortion effect?—B. L. A.

Answer: As I recall, the effects in Wegge's film were produced with a

Continued on Page 120

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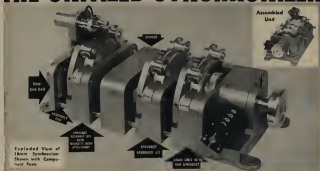
*Partial list of producers who submitted requested information in April to meet printing deadline.



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COLOR IN MOTION PICTURES AND TV

Part I: The three-color theory.

By ROBERT ALLEN MITCHELL

THE USE of full color adds immeasurably to our enjoyment of motion pictures and television. Much of the reason of the modern panoramic theatre scene may be attributed to the skillful use of color, and commercial television is exploring more intensively than ever before the limitless visual possibilities of color. Indeed, it has been authoritatively predicted that most TV broadcasting will be done in full color within the next four or five years.

Widespread use of color in TV is a matter of great concern to the cinematographer whose work has been confined largely to the television field—that is, to monochrome TV. He may soon be given color film and color lighting facilities with the admonition to maintain the high artistic standards which have characterized his black-and-white work. When that day comes, the TV cinematographer must adjust his pictorial techniques from the familiar "achromatic" factors of form, value, and contrast to the new element of color.

The transition from monochrome to

good color production work is not easy because color film, unlike the adaptive human eye, is basically "literal" and unable to "accommodate" to the color of set illumination. A sheet of white paper looks white to the eye whether illuminated by candlelight (which is definitely orange), sunlight (which most persons call "white light"), or high-intensity arc illumination (which is relatively bluish). Color film, on the other hand, records exactly what it sees—orange paper by candlelight, blue paper by carbon-arc light, and white paper only at a specific predetermined "color temperature."

Because most professional color negative is "balanced" for a color temperature of 3200° on the absolute Kelvin scale (the "whiteness" of high-efficiency tungsten incandescent lamps commonly used for set lighting), a combination of "redies" for fill lighting and arc lamps for key lighting produces very bad effects on color film unless the arcs, which emit a somewhat bluish light of approximately 6000° K, are filtered by appropriate yellow

ish gelatins to match the relatively yellow radiation of the tungsten lights.

Similar difficulties are encountered when exterior shots are photographed on 3200° color negative, which is customary in professional work. Direct sunlight during the late morning and early afternoon hours has a color temperature of about 5000° K. In this case the yellowish filter must be placed over the camera lens, and if skies are used on location to lighten shadows, these must be fitted with bluish filters to match the color-quality of sunlight.

The color-temperature problems of color photography often are aggravated in the studio by line-voltage fluctuations which change the color, as well as the intensity, of tungsten lamps, and out of doors by the varying altitude of the sun, which becomes redder as it approaches the horizon. It is true that minor variations in overall color temperature can be corrected in printing, but the color cinematographer is nevertheless not permitted to forget color temperature for a single moment. The writer believes that this matter is by far the most important of all the several problems attendant upon the switch from black-and-white to color filming.

The reader has now undoubtedly correctly surmised that the term "white" is a purely relative one. On the basis of the older color negatives and the original Technicolor 3-strip camera, white was in the neighborhood of 5000° K, the color of sunlight or low-intensity arc illumination. The new

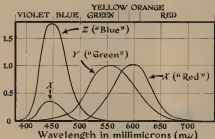


FIG. 1—Response of the normal human eye to the visible spectrum in terms of three primary colors. Z is extreme red, Y is green, and X is blue. Note the overlapping of the three primary "response curves" and the secondary peak of the red curve in the violet region.

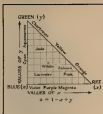
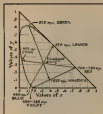


FIG. 2—An oversimplified color triangle. The colors produced by additively mixing the primary, red, green, and blue are arranged along the sides of the triangle. Experimentally, however, that most of the spectrum colors are more vivid than these additive mixture colors.

FIG. 3—The CIE chromaticity diagram. By projecting three "superluminescent" points, the spectrum colors can be included in the color triangle, where they form a horseshoe-shaped curve known as the spectrum locus. All real colors are contained within this locus and the "purple line" which connects its two extremities.



highly sensitive color negatives are balanced for the lower (yellowish) color temperature of 3200° K. To these films, tungsten light is "white." Certain brands of several color films are manufactured in two types, one balanced for 5000° K for outdoor use, and the other for 3200° K for indoor use with fluorescent lamps. The two films may be interchanged (with a slight loss of speed) if appropriate correcting filters are placed over the camera lens—a bluish filter for the outdoor film used indoors, and a yellowish filter for the indoor film used outdoors.

There are so many "whites" that it is perfectly proper to regard any and all of them as colors—colors to be recorded as faithfully as red, yellow, lavender, or flesh-tint by the color film or camera. But how are so many colors faithfully recorded and reproduced?

A color photograph film or a color TV camera works on the same simple theory which has often been used to explain human color perception, namely, that the retina of the eye contains three color receptors, each of which responds to roughly one-third of the entire visible spectrum of colors. The "red receptor" sees the wavelengths of light from the longwave extreme in the red through orange, yellow, and chartreuse to the green region. The "green receptor" sees the wavelengths from

orange-red through yellow, chartreuse, green, and cyan to blue. The "blue receptor" sees the wavelengths from green through cyan, blue, and blue-violet to the shortwave extreme in the violet (Fig. 1).

The overlapping nature of these three bands of color perception—red, green, and blue—results in the intermediate hues named above; and a re-emergence of red sensitivity in the shortwave regions of the spectrum, where blue is the predominant color, is responsible for the violet color of the shortest visible wavelengths. The purple and magenta are hues which do not occur in the spectrum, but they can be produced with maximum purity by combining violet light with red light in various proportions.

Whether this "trichromatic theory" offers the true explanation of color vision or not (scientists are undecided), it stands us in good stead when we wish to devise a practicable color-reproducing system for photog-

raphy or television. The requirements for a workable color system are thus very simple in theory, though undeniably beset by numerous "bags" in practice.

Briefly, in order to photograph a scene is full natural color, we must separately record the red, green, and blue components of the scene. This may be done by using a film having three color-sensitized emulsions (each of which records approximately one-third of the spectrum) or, more directly, by using a camera fitted with an optical beam splitter and three separate films.

The beam splitter produces three identical images of the scene upon which the camera is focused. Over each image is placed a color filter whose transmission is nearly identical with the response characteristics of the corresponding primary color receptor of the eye. This gives us red, green, and blue "records" of the photographed scene in terms of black-and-white values on a balanced, red-sensitive panchromatic negative.

Three positive transparencies are then printed from the negatives; and these are superposed on a projection screen by three identical projectors set up very close together. Over the lens of the projector showing the print of the red record is placed a red filter, and so with the projectors showing the green- and blue-record prints. The original scene is reproduced on the screen in accurate natural color.

Although the 3-projector process is only rarely employed, it illustrates the "additive" system advocated for television and makes all other color processes more comprehensible.

Continued on Page 545

FIG. 4—The color gamut resulting from various arbitrary sets of primary colors plotted on the chromaticity diagram. The 700-525-440 millimicron set encloses the widest range of colors, but most of the violet spectrum colors lie outside even this satisfactory gamut.





DIRECTOR OF PHOTOGRAPHY Charles Lang, A.S.C. (bottom center), looks on as VistaVision camera photographs scene on location for the

Hal Wallis-Parmount production. Last Train From Gun Hill: Use of VistaVision provided maximum mobility for the camera

Photographing "Last Train From Gun Hill"

Carefully selected camera angles give strong dramatic impact to this taut western melodrama filmed by Charles Lang, A.S.C.

By HERB A. LIGHTMAN

"LAST TRAIN FROM GUN HILL," Hal Wallis' production for Paramount release, is a blockbuster of motion picture entertainment that lifts the audience with all the force of a pile driver. As robust film fare it derives its tremendous impact from the direction of John Sturges, performances by an unusually able cast, and the magnificent color VistaVision camerawork of Di-

rector of Photography Charles Lang, Jr., A.S.C.

"Last Train" is not a western in the usual horse-chase, shoot-'em-up sense. Rather it is a taut, hard-hitting melodrama of human emotions set in a western locale—a clean, direct narrative that flows relentlessly to its story line until the inevitable violent denouement has been realized.

The film seizes attention in its opening sequence when two drunken no-good cowpokes (Earl Holliman and Brian Hutton) rape and murder a beautiful young Cherokee squaw. Her young son steals one of the murderer's horses and races to bring word to his father (Kirk Douglas) who is the Marshal of the peaceful Oklahoma town of Pawnee.

Douglas recognizes the horse's saddle as belonging to Craig Belden (Anthony Quinn) a close friend he hasn't seen in ten years and now absolute ruler of the town of Gun Hill.

With heavy heart Douglas sets out for Gun Hill to apprehend the culprit.

He confronts Quinn with the accusation that his son is the murderer. Quinn is horrified at this revelation, but he cannot bear to deliver his only son up to justice. Douglas warns him that he intends to find the boy and bring him to trial.

Douglas traps the boy in a saloon, knocks him out, slings him over his shoulder and fights his way out of the place, holding up in a hotel to await the train that will take them back to Pawnee. Meanwhile, Quinn and his henchmen surround the hotel, determined to set the boy free. In a hair-raising climax, Douglas manages to get his prisoner to the train station, but rapid gunfire from an unexpected quarter and the irony of fate conspire to cheat him of formal justice, while meeting out a well-deserved consequence to the guilty party.

Photographically, "Last Train" is a triumph. Director of Photography Lang has slanted the VistaVision camera perfectly to the demands of this virile, knock-down-drag-out drama. His visual treatment of the script lends it largeness of scope while still maintaining the tight-in-the-clutches impact of more intimate action. No stranger to the western motif, Lang has to his credit such outstanding films as "Man From Wyoming," which he photographed for Director Anthony Mann,



CHARLES LANG, JR., ASC

as well as the highly successful "Gunfight at Ok Corral" which he also did with Sturges under the Hal Wallis production banner.

"In a western your exteriors have to be the very best," Lang comments, "because that is what people go to see—the West as they imagine it. You have to select your angles carefully in order to get largeness and space into your compositions. You must convey the immensity of the great outdoors. The best way to do this is to get down low with your camera to show sky and the tops of things."

Wallis, who likes a "big" look in his pictures, and Sturges were both in complete accord with this idea. They chose as their locale a stretch of breathtaking country south of Tucson, Arizona, close to the Mexican border. The ranch exteriors were laid against sweeping brown fields with the edge of

a little black mountain on the horizon. About twenty miles away they selected a dry river bed fringed with trees in which to shoot the opening chase and rope scenes. Lang achieved a wonderful feeling of excitement and speed by panning through the trees as the drunken cowboys pursue the Indian girl and her son in their buggy.

The company spent a week filming in these Arizona locations, then moved back to the studio where an impressive construction job recreated the western town and railroad head of Gun Hill on five acres of Paramount back lot. Built at the cost of \$100,000, the town was completed in six weeks. It consisted of a hotel, saloon, bank, rooming house, livery stable, dry goods store, sheriff's office and jail, general store, post office and assorted shops. Though this western street was limited in space, Lang managed to lend it the scope of a sprawling frontier town through the use of a low camera and wide-angle lenses.

"Western streets can be very dull photographically unless you adopt low enough angles to show the tops of buildings," he points out. "When you shoot level into things you lose the whole outdoor look. The set might as well be an interior. Low camera positions, especially with a wide-angle lens, make it possible to do wonderful things with diagonal lines—sloping roofs, pieces of sky, tall men standing against buildings. It makes for dynamic composition."

Lang's activity is no mere outdoor thing; it is equally apparent in the in-

Continued on Page 140



THIS BARROOM scene reveals the low camera angle and dramatic lighting which characterize much of Lang's photography for "Gun Hill."



NIGHT SEQUENCES owe much of their force to fact they were actually shot at night. Note, too, dramatic impact here of low camera angle.

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AURICON CINE-VOICE

This small, moderate-priced 16mm single-system sound camera has become an important tool for professional cinematographers.



HEAVY DUTY 3 LENS turret that takes all "C" mount lenses is one of many professional features of the Auricon Cine-Voice II. Film capacity is 100-ft. takes regular daylight film loads.

FOR MORE THAN A DECADE, the name Auricon has been synonymous with 16mm single-system cameras. Berthoud-Bach, Inc., makers of the Auricons, stands virtually alone in its respective field. For there are no other 16mm sound cameras on the market, here or abroad, that compare with the Auricon in its ability to deliver consistently good results in the production of single-system sound films. Actually, there are no other 16mm single-system sound cameras presently being manufactured in the U.S.

The Auricon line of cameras consists of the Cine-Voice, the Pro-600 and the Super-1200. In discussing these three basic cameras recently, Walter Bach, President of Berthoud-Bach, Inc., said that the Cine-Voice is the "Chevrolet" of the line, the Pro-600 the "Oldsmobile", and the Super-1200, the "Cadillac." Just as the number of Chevrolet cars on the highways exceeds the number of Old-



CAMERA OPENED to show details. Camera mechanism is mounted on Neoprene rubber cushions for quiet running. Optical sound recording unit is right of film magazine in photo.

THE COMPLETE Cine-Voice II camera and sound equipment is shown in use at right. Amplifier - motor - battery unit sits in carrying case behind camera. Berthoud-Bach, Inc. manufactures the sound recording unit by acoustics.



models and Cadillacs, so, too, the Cine-Voice exceeds its stabilizers in number.

The 100-foot film capacity Cine-Voice was first introduced in 1949. The advent of commercial television programming changed the destiny of the Cine-Voice, for newscasts became a highly important part of daily video programming, and a vast new market for newsreel footage on 16mm film was opened up. TV news cameramen found the Auricon Cine-Voice, with its portability, reliability, and high-fidelity sound recording, ideally suited to their needs. Thus, the small, moderate-priced single-system sound camera suddenly became an important tool in the professional field of cinematography. The little 12-pound camera is today the workhorse of almost all TV newscast men, and has been subjected to more modifications than records can recall—many of them described from time to time in these pages. Since its initial debut, the Cine-Voice sound camera has been extensively redesigned by the manufacturer, is now known as the Cine-Voice II, and features an optical three-lens turret plus many other improvements. It may be purchased as a silent camera with a single-lens mount instead of turret, but minus the sound equipment, for around \$180.00. Equipped completely for sound, it may be had in combinations of equipment and accessories at prices ranging up to a little over \$1,000.00.

The sturdy, machined aluminum case of the camera is well designed for both appearance and balance. The new, heavy-duty 3-lens rotary turret takes all standard 16mm "C" mount lenses of any focal length, also Cine Kodak bayonet-mount lenses when equipped with "C" mount adapters.

The finder, located on left side of camera, shows a large view of the scene and has adjustment for parallax. Its basic field of view matches that of the 13mm wide-angle lens. Professional-type transparent amber color mattes are provided that drop into a slot to alter the finder field of view to match other lenses ranging from 17mm and 25mm, to the 2- and 3 inch telephotos.

The camera mechanism is mounted on Neoprene-rubber cushions for quiet running and to prevent any camera noise being picked up by the recording microphone. Actually, the camera runs so quietly that a red warning light is a fixed accessory at the rear to indicate when camera is running.

The rotary shutter has a fixed opening of 175°, which provides an exposure of 1/50th of a second per frame at the standard sound speed of 24 fps (36 feet per minute).

The film gate is directly behind the picture-taking lens and consists of the aperture plate and pressure plate. In the gate the film moves over a series of stainless-steel balls—a patented feature designed to eliminate film-emulsion pickup and to insure sharp, in-focus pictures. The film pull-down is self-engaging and made of case-hardened and tempered steel, precision ground to size—all of which makes for rock-steady pictures and quiet film flow.

A balanced flywheel is an integral part of the Cine-Voice camera mechanism. Its purpose is to provide smooth, steady film motion so essential to recording a sound track on the film completely free of the variations in sound commonly known as "wobble" or "flutter." Thus, the camera cannot be stopped instantaneously on a single frame of film, as with amateur cine cameras that are



COMPACT, PORTABLE, easy to handle, the Cine-Voice II with complete sound-recording unit, microphone, and accessories, may be had with a single carrying case, as shown above, or with the equipment distributed in two smaller cases.

spring-driven and have no flywheel. When the Cine-Voice camera is switched off, a few frames of film will continue past the film gate before the drive mechanism slows to a complete stop. This is of no particular disadvantage, as it is usually necessary in editing to cut out a small section of the film between scenes to achieve the desired continuity, pace and timing. A footage indicator on the back of the camera shows the amount of unexposed film on the spool.

Standard equipment is a constant-speed 115-volt A.C.

Continued on Page 388



THE CINE-VOICE II may also be equipped for magnetic sound recording. The Auricon "Magnechic" recording unit (in single)—an optional feature—may be installed at factory at time camera is purchased, or at any time in future.

HOMEMADE FILM BIN

Eases task of editing 16mm film.

By GEORGE J. YARBROUGH

United Film Productions, Orlando, Fla.

ANYONE FAMILIAR with the problems of editing 16mm film knows it is difficult to splice and its images almost impossible to see without the aid of a magnifying viewer. It is convenient and easier on the eyes to look at a batch of strips hung right side up against a light that clarifies the image.

With the latter thought in mind, we recently constructed a film bin having the added convenience of easing the task of identifying the images. The completed unit is pictured in Fig. 1, at right.

Much of the conventional film editing equipment found today utilizes small pins on which to hang strips of film by the sprocket holes. While adequate, this method often results in damaging sprocket holes and tearing film.

Our bin utilizes ordinary spring clothespins, slightly modified, for holding each filmstrip upright for easy viewing, while below is a multi-bladed receptacle that protects the remainder of the strip, no matter what length it may be.

The manner of preparing and inserting the clothespins is shown in Fig. 2. First, 2 divisions were marked off 1-inch apart on the bin header—a piece of lumber 1"x2". Each clothespin was disassembled before mounting on the board. To permit removing pins without splitting the wood, two small holes were drilled in one member of the pin. It was then mounted in place on the header with two carpet tacks. A large drift punch was used to drive the tacks to prevent splitting the clothespin.

After all metal clothespin halves were thus mounted,



FIG. 1—Author's homemade film bin with back-light for easing the task of identifying film strips; modified clothespins are used instead of pins to hold the strips which extend downward into receptacle bin.

each spring was then bent slightly to reduce the pressure between jaws of the clothespin.

Before the clothespins were re-assembled, surfaces of the clip area were sanded down with a fine grade of sandpaper so they would not scratch film surfaces. We found that the gripping pressure of the jaws was so slight that Ektachrome original film could forcibly be pulled out of the clothespin without damaging the emulsion.

Continued on Page 563



FIG. 2—Method of preparing and mounting clothespin halves are drilled in one member and tacks used for mounting.



FIG. 3—Tubular light bulbs mounted in back of header of bin mark forward light for shadowbox that eases task of identifying filmstrips.



FIG. 4—Lower jaw made of old headrest, formed like an open-end box, and inserted in the bin to give protection to films.

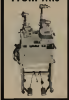


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Electrical Tripping Mechanism For Sound Mixing

Simplifies use of tape recorders for budget sync-sound productions.

By RONALD W. MOORE



FIG. 1.—TRIPPING MECHANISM that actuates sound recorder consists of plastic beam with slot to admit passage of fiber, also holds two electrical contacts (1) and (2). Here contact (1) is moving under span to short contacts of device. Normally, it rests close to contact (2), and makes momentary contact when deflected one of the beams prior indicated at (3).

ONE OF THE PROBLEMS facing small film production units is the high cost involved in obtaining the necessary sound equipment to enable handling their own sound mixing needs. Standard quarter-inch tape recorders offer acceptable quality for various sounds and sound effects but they usually cannot be depended upon to maintain synchronization for any extended period of time. However, where the standard quarter-inch machine can be accurately started at a critical time, it may be used for many recordings of short duration.

This is the theory the author maintained in pursuing an economical method of handling sound mixing problems for Michigan State University's Motion Picture Production Unit where he was employed. All the film production

equipment at the University is 16mm. One Bell & Howell projector with synchronous motor, a Kasecok synchronous magnetic recorder, and a Wollensak quarter-inch tape recorder were used in developing the device which the author calls an electrical trip-point mechanism for sound mixing.

The principle of the device is simple. A notch cut in the edge of the work print of the picture for which a sound track is being recorded causes an electrical impulse to automatically actuate the tape recorder. There are three component parts in the device: (1) An attachment on the projector which will recognize a notch in the work print and instantly set up an electrical impulse (Figs. 1 and 2). (2) An electrical system consisting primarily of a transformer and a relay, and (3) a solenoid mounted on the tape recorder to instantly actuate the machine upon receiving the electrical impulse.

The device on the projector consists of a plastic plate mounted just above

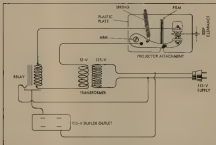


FIG. 3—SCHEMATIC of electrical system for sound curing device

the top feed sprocket having a slot that allows the film to move through the projector in the normal manner (Fig. 1). A metal arm mounted on the photo plate is hinged and slightly spring loaded so it will ride gently against the edge of the film as it is being projected (1 in Fig. 1). On the end of the arm opposite the hinge a small brass bolt serves as an electrical contact point. There is another contact point mounted on the photo plate in such a manner as to clear the point on the arm by about .020 of an inch as long as the film is threaded in the projector or traveling through it. When a notch is cut in the edge of the work plate, between the sprocket holes, the open or notched area causes the points to make contact.

The various parts of the electrical system are mounted on a panel on the left side of the projector. Mounted on the panel is a relay with the coil wound for 12 volts, also the contact points for 110 volts. Power is supplied by a standard 2-14 lamp cord connected to the transformer and to a standard duplex outlet connected in series with the points on the relay. The 12-volt circuit of the transformer is connected in series with the contact points mounted on the projector and the coil of the relay.

The attachment on the quarter-inch tape recorder is essentially a plate mounted on the case of the machine near the pause button and having a movable arm attached in such a manner as to secure the button in the pause position (See Fig. 3). A 110-volt solenoid (6) is mounted on the plate and mechanically connected to the arm (5) in a manner which will release the pause button (4) each time the solenoid is actuated by an electrical impulse. The solenoid is supplied with a 2-14 lamp cord and standard male plug.

Now it may be seen that if 110-volt power is supplied to the device, the solenoid connected to the outlet on the panel of the projector, the recorder locked on "pause" by its attachment present in the play position, and if the projector is set into operation, then a notch in the edge of the work print will instantly actuate the recorder.

In order to synchronize the sound effects with the picture, some reference points must be selected. The arm of the device mounted on the projector rests against the film exactly 18 frames ahead of the aperture gate of the pro-

FIG. 3 — MECHANICAL LINKAGE (3a) holds pause button in recorder and the solenoid (4) pulls the catch (5) and allows the normal spring pressure of button (4) to engage (interrupt) each notch of the recorder.



jector. With the film traveling at 24 frames per second the electrical impulse will be set up just $\frac{3}{4}$ ths of a second prior to the time the frame beside the notch will be projected.

The procedure is to notch the exact frame in the picture where the desired sound is to occur or begin. Subsequently the tape must be read $\frac{3}{4}$ ths of a second in advance of the first sound. With tape marking 7½ inches per second then it could be pulled backward 5.625 inches at a rest point $\frac{3}{4}$ ths of a second prior to the first sound.

Considerable testing was conducted in order to validate the accuracy in timing and it was found that the 5.625" pull-back was accurate enough to remain within the 24th of a second tolerance of the film. This procedure was found to be satisfactory because it is very convenient to notch the film at the

exact frame where the sound is required. The $\frac{3}{4}$ ths of a second time interval allows for stabilization of recorder speed and reaction time for the sound mixer to open the channel during the mixing process.

In initial tests of the device, 16mm pictures of a baseball game were used and sounds of the ball hitting the bat, crowd noises, etc., were supplied by two $\frac{1}{4}$ -inch tape machines.

More than one recorder may be actuated by the tripping mechanism simply by placing switches in the 110-volt line between the projector and the solenoids on the tape machines. (A solenoid and release device is necessary for each tape machine used.) Then by opening the proper switch at the correct time any machine or combination of machines may be started at selected times.

Continued on Page 344



FIG. 4 — TYPICAL LINEUP at adjustment for mixing sound recorded on quarter-inch tape, using the electrical tripping mechanism described and described by Miller. From left are: switch for disconnecting electrical impulses to each recorder, for each sound mixing panel, and two standard tape recorders. Device described in Fig. 3 above is shown at (1), while another solenoid control is attached to first recorder at (7).

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ALL WEATHER CAMERAMAN

Vincent Hunter turns inclement weather to his advantage when photographing travel films for Union Pacific Railroad.

By CLIFFORD V. HARRINGTON

TWO PHOTOGRAPHERS with motion picture cameras were working almost side by side near the rim of the Grand Canyon. Suddenly a storm clouded the sky and a brisk rain came pelting down. One of the men quickly gathered up his equipment and hurried for shelter. The other, Vincent Hunter, remained and continued shooting. The unusual, off-beat motion pictures Hunter so often gets this way have earned for him a nation-wide reputation as one of America's leading scenic motion picture photographers.

When other cameramen are indoors curbing cloudy or rainy weather, Vincent Hunter, who is both manager of and cinematographer for The Motion Picture Bureau of the Union Pacific Railroad, invariably is out with his Humm Arriflex or Cine Special camera filming nature in some unusual dramatic mood. Thirty-five years of movie



SHOTS OF WILDLIFE and unusual scenic views are imaginatively photographed by Vincent H. Hunter for the many promotional films he produces for Union Pacific Railroad. Hunter is Manager of the company's Motion Picture Bureau. He's shown above using an Arriflex 16, operated by lightweight battery pack carried on shoulder strap.

making has taught him, among other things, that there is no such thing as an "ideal" condition for shooting motion pictures in color. Hunter believes that any good cinematographer can make effective movies in any kind of weather, as long as there is enough light to produce an acceptable exposure with the film and camera being used.

At the Grand Canyon location mentioned above, Hunter erected a protective canopy over his Arriflex 16 camera and tripod, attached a remote controlled stop-motion device to the camera starting button, then retired to the shelter of a tree while the camera recorded its interval exposures. The building of the storm over the far canyon rim. The resulting footage of dark, menacing clouds followed by a driving rain forms a dramatic climax for "Painted Canyon," one of his recent Union color productions.

While Hunter has several fine cameras to implement his work, he points out that expensive equipment is not necessary for recording the type of shots that add punch to the "formal" travel film. "Any camera," he says, "having a single-frame release and a range of motor speeds can produce many interesting pictorial effects."

"It is much more important that the photographer have a creative imagination plus a persistent tendency to make effective use of his camera," he added.

Hunter possesses both of these qualities. For one of his recent pictures he wanted a shot of clouds rolling away rapidly from the camera toward a range of mountains in the distance. The scene, out of the ordinary in concept, was to be photographed in stop-motion to "step up" the cloud action on the screen.

He made several trips to a chosen locale before he found the desired weather conditions and cloud formation. He then visualized the speed he wanted the cloud action to take on the screen and set his camera stop-motion device accordingly. The result was an awe-inspiring

Continued on Page 543



FROM THE DESERT TO ALASKA, Vincent Hunter and his Union cameras have photographed most of America's scenic wonders—many of them under unusual weather conditions that lend new interest and pictorial beauty to otherwise ordinary vistas.

EXPOSURE ACCURACY WITH MAGIC-EYE CAMERAS

A progress report on new developments in automatic exposure control for cine cameras.

By DON NORWOOD

AUTOMATIC, ELECTRIC-EYE exposure control—the big innovation now being featured in many late model cine cameras—not only is winning acceptance among amateur movie makers, but also is being adopted by some professional cameras used in certain specialized fields such as photomicroscopical



FIG. 2—Typical example of underexposure when subject is photographed against bright background, with exposure based on reflected light reading. Here overabundant light overexposed background, the meter causing film ground subject to be underexposed.

The practicality of employing automatic exposure control generally in professional cinematography rests on the outcome of confusing experiments.

The electric eye used in many of the newer cine cameras is a light-sensitive photoelectric cell which controls the iris of the camera lens according to the prevailing light or scene brightness. Primary aim in automatic exposure control is to enable the camera user obtain a higher percentage of good exposures with a minimum of care on his part. From a merchandising point of view the idea has exceptional appeal. But because most cameras presently featuring built-in electric-eye exposure control adjust the lens stop according to the volume of light reflected by the scene, the innovation poses some limitations readily evident to the professional cinematographer.

One of the characteristic faults found in many amateur films exposed on the basis of reflected light measurement is that scenes having persons or objects photographed against a bright background invariably show the foreground subjects underexposed as in

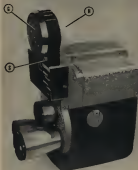


FIG. 1—Principle of Norwood Incident/Reflected Dynamic Beam cine camera features dual automatic electric-eye exposure control that evaluates either incident or reflected light. (A) is grid for reflected light evaluation, (B) is hemisphere light indicator of incident light evaluation, (C) is selective button for shifting from one evaluation to the other.

Fig. 2. This is because any over-bright object or area in a scene unduly influences reflected-light type meters, causing an overreading that results in underexposure of the principal subjects in the scene. The same is true where there is scene backlighting in the scene. This is graphically illustrated in Figs. 3(a) and 3(b). If some of the backlight which prevails in scene 3(a) strikes the photo-cell of the camera's light-measuring device, this bright light will cause the electric-eye to close down the lens iris below the point that will render good exposure on the subject, resulting in underexposure shown in Fig. 3(b).

In scenes where the background is substantially darker than the foreground subject, as in Fig. 4(a), the effect is just the reverse; the excessive dark area (background) unduly influences the electric-eye of the reflected-light measuring device so that it "opens up" more than necessary. This leads to opening the lens wider than necessary which results in slight overexposure of foreground subject as illustrated in Fig. 4(b).

Some electronic camera-tend to produce inferior exposed pictures where the overall light reflectance in the scene departs substantially from the standard of 18% reflectance (medium tone). It has been noted that all cameras of this type presently being marketed feature electric eye exposure control devices of a type similar to that used in reflected light exposure meters.

It has long been fairly well known that best photographic results are obtained with reflected light exposure meters when they are used to determine exposure on the basis of multiple readings of a scene, i.e., completely measuring the light reflectance of the scene in a series of closing readings on shadows, highlights, medium tones, etc., then averaging the readings to arrive at the exposure norm. As a rule "one-shot" reflected light readings taken from camera position do not always produce the most desirable exposures, and it is this fact that must be considered when shooting movies with many case cameras having this type exposure control. An interesting reference on these matters is to be found in a technical paper by Allen L. Soren, of Eastman Kodak Company, Rochester, N.Y., entitled: "An Evaluation of Certain Techniques of Using Exposure Meters," which was published in the *Journal of the SMPTE* for October, 1956.

The convenience factor of the new electric-eye cameras is so great, however, that most users of these cameras—shooting for the most part front-lighted scenes having average reflectance—obtain acceptable exposures. It is when they attempt to shoot subjects against extremely dark or extremely light backgrounds, against the sun, or where strong backlighting prevails, that they produce disappointing exposures, and without really knowing why.

Can more versatile and accurate electric eye cameras be produced? Before answering this question, let us review briefly some of the interesting points in the history of photoelectric exposure meters. The first such meters were produced during the early '30s. These were of the reflected-light type, that is, they measured the light reflected from the scene to be photographed. Although these meters readily became popular, some discerning photographers found loopholes in their performance—principally the same as those described above for electric-eye cam-



FIG. 2(a)—Backlighting scene photographed with correct exposure



FIG. 2(b)—Same scene as it appears in re-flected light type exposure indicator

eras. The writer was one of those who believed at the time that more accuracy was possible in metering light for photography, and began research on the problem which culminated in the invention and design of the Norwood incident-light exposure meter whose salient feature was a patented three-dimensional light collector (a translucent hemisphere) as an adjunct to the photo-electric cell. This 3-D light collector

represented the camera side of a three-dimensional photo subject. It made the meter responsive to all incident light reaching it from all angles—the same as that falling on the subject. Use of this incident-light meter produced many advantages in photographic accuracy and versatility, and it was widely accepted by both amateur and professional photographers.

Continued on Page 544



FIG. 4(a)—Scene with dark background correctly exposed



FIG. 4(b)—Same scene photographed on basis of one-shot reflected-light metering

STABILIZER FOR HAND-HELD CAMERAS

Gyro attachment steadies camera when shooting without a tripod or from aircraft or moving vehicles.

By JOSEPH V. MASCELLI



ARROW POINTS to gyro stabilizer attached to base of 35mm Eyemo camera. Gyroscopic device steadies camera for hand-held shooting.

THE KENYON Gyro Hand Stabilizer is a completely new approach toward minimizing the angular movement or wobble in hand-held camera shots. It aids in eliminating the vibration resulting from involuntary movement of the cameraman's hands and arms or the sway of air, sea or land vehicles. The stabilizer controls such undesirable motion by providing a firm, though movable, resistance through a unique application of gyroscopic principles.

The unit is a precision instrument measuring approximately three by five inches, about the size of an elongated baseball. It weighs only one and three quarters pounds and will fully stabilize hand-held instruments such as cameras and binoculars up to nine pounds in weight. It consists of two gyros turning on different axis. The gyro motors develop between 20,000 and 23,000 RPM, thus providing a steady support because of the tendency of a gyro to remain on a given axis. In operation, the stabilizer acts like a geared tripod head, allowing the cameraman to pan in any direction with amazing ease, even when shooting from a vibrating helicopter or bouncing car. The cameraman can "over-power" the gyro, when desired, by "braking" its axial hold and re-establishing the camera in a fresh position, where the gyro once again takes over.

This clever gyroscopic instrument was invented by Ted Kenyon, of Old Lyme, Connecticut, whose background includes work on automatic pilot mechanisms, including a blind flying gyro device for helicopters. The original need for the instrument arose when Kenyon had difficulty holding a pair of binoculars steady while fighting navigational markers in overcast weather. The many photographic possibilities for utilizing the unit for hand-holding movie cameras and still cameras equipped with long telephoto lenses, naturally suggested themselves once the stabilizer was perfected.

An interesting test, recently conducted by the U. S. Air Force at Edwards Air Force Base, dramatically proved the effectiveness of the gyro stabilizer. It was attached to a Bell & Howell 16mm Filmo camera equipped with 5-inch telephoto lens, 400 ft. magazine, and electric motor. Aerial scenes were filmed during a flight in "rough" air with the camera hand-held. Shots were also made for comparison without the gyro stabilizer. The latter shots were considered useless because the combination of telephoto lens, rough air and inherent vibration of the helicopter set up extreme vibration in the camera.

The comparison scenes, made under identical conditions using the gyro attachment, were amazingly smooth, with just a hint here and there of roughness when a very bad bounce caused the gyro to "break away" and then regain its stability.

Use of this gyro stabilizer is not limited to movie cameras, however, since its steadying action is just as useful with binoculars, still cameras, sextants or any other hand-held optical instrument. Its unique gyroscopic action is particularly helpful when shooting from moving vehicles such as speeding autos, boats and airplanes. Police and rescue workers have found the unit extremely useful when using binoculars from helicopters. A recent police test showed that auto license plates could be easily read with 6 x 50 binoculars from a helicopter hovering overhead.

While the optimum object weight that can effectively be used with this device is approximately nine pounds—which covers most 16mm cameras—tests have shown that great improvement in steadiness is offered, although no-

Continued on Page 144

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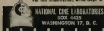
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PHOTOGRAPHING "GUN HILL"

Continued From Page 545

terious sequences of the picture, as well here, again, there was a challenge, he came western interiors are usually small and unimpressive. Moreover, they often feature solid wallpaper and similar decor of the period that is unattractive and distracting to the eye. Through the use of dramatic lighting and camera angles he managed to make these drab interiors take on greater visual interest.

An outstanding example is the sequence in which Douglas has taken Holman prisoner and has him hand-cuffed to the bed in a hotel room while they wait for a train out of town. The sequence begins in the afternoon and the windows are brightly lighted from outside to suggest intense sunlight. Then dusk falls and a ruddy glow suffuses the room as the sun sinks toward the horizon. Outside, the landscape silently waits, surrounding the hotel and determined not to let Douglas pass out alive with his prisoner. There is a quiet hush over all, expectant and ominous. Suddenly it is night. The interior of the room fades into darkness—yet, overall there is a cold unearthly glow, a kind of eerie moonlight that turns the faces of the men chalk white, portending tragedy and death. Lang achieved this effect through the use of "cold" light sources with only the faintest blue gelatin over the units. In front of the camera lens he used a light fog filter to add a frosty touch. Then he had the lab print the sequence neutral, as nearly devoid of color as possible. The effect on the screen is chilling—perfectly in key with the suspense generated by the action.

This mood persists as Douglas walks his prisoner out of the hotel at the point of a shotgun, and standing with him thus in a buggy, slowly drives to the station to meet the approaching train. All along the route hostile gunmen stand, and during a shock for fear of causing the prisoner's death. Their faces are made menacing by cross-light, deep shadows and low-angle compositions against a black sky.

This night sequence owes much of its force to the fact that it was actually shot at night instead of in the daytime with blue filters and underexposure to simulate night. Lang is fundamentally opposed to the commonly used day-for-night technique. "These days they argue

you to shoot night scenes in daylight for the sake of economy, the point-out, 'but for every scene shot this way that looks good I'll show you twenty that look just like underexposed scenes printed blue'—the effect just doesn't come off."

Lang did not have to settle for one odd best in sight scenes for this picture, even though it took almost every lamp the studio owned to light the town of Gun Hill, producer Wallis readily okayed the expenditure and the resultant climactic night sequence packs a tremendous dramatic wallop.

Throughout the film Lang used backlight wherever possible. Even in exterior long shots he placed dark figures almost in silhouette against light backgrounds to make them register more dramatically than they would have in front or three-quarter light. This helped avoid the picture-postcard look so common in outdoor epics and kept the faces looking more natural.

In his interiors he also used back-light and cross-light whenever possible to accentuate dramatic effect. A long hotel corridor which figured in some of the important plot action had to be lighted adequately to show the action but subdued enough to remain true to the style of low-key lighting he had set for the sequence. Also, it was necessary to play down top lighting on this narrow set so that the light source would not appear to be coming from the ceiling.

Since the film was a period piece, set in a "goldlight" era, the problem of conveying the effect of actual flame in the lighting fixtures was a constant one. Gas flame does not have sufficient intensity to be photographically convincing as a light source, so it was necessary to accentuate the effect by means of pools of incandescent light supposed by emanating from the fixtures. Then, too, the flame registered on the color medium as more white than it appeared to the eye. Lang controlled the effect by using small yellow bulbs in the fixtures behind glass just frosted enough to give the illusion of flame. He used light yellow gelatin over lamps nearest the fixtures to simulate an authentic flame glow.

The final sequences in "Last Train From Gun Hill" are almost exclusively low-key, an effect which Lang gained by keeping his backgrounds dark while lighting the players starkly against them. At times he reversed the effect by silhouetting faces against lighter

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areas. He readily admits the dilemma this type of lighting has caused for the cinematographer since the advent of the drive-in theater: "The usual warning is 'Don't make your lighting too sketchy or they won't be able to see anything in the drive-ins.' And yet, if you insist, you are going to compromise every effect until there is no effect—just nothing at all. I feel that we still have to have dark areas to convey mystery and mood—and that we must shoot pictures primarily for the larger audiences that attend the hardtop theatres. I always try to keep the light on the players a bit brighter than the norm, however, so that the lab can peep the film lighter for the drive-ins, if necessary."

"Last Train From Gun Hill," in the final analysis, is a study of conflict between men, and Lang never lost sight of the fact that the really important elements were people and not just vistas of impressive scenery. He was aided toward this realization by the Vista-Vision camera, in which the film moves through the camera horizontally to afford the advantage of a double-see frame which is then reduced down to standard aperture size in printing to provide release prints of exceptional sharpness and clarity of detail. The ultimate result is that the human figure

remains visually important even though it may be a tiny speck far off on the horizon. There is no danger that it will be lost in a welter of grain and soft focus.

Because Lang fully realized the importance of the human element in this film, he paid great attention to making the leading players photographically important. They seem to tower over ordinary humans, striding to meet Destiny head-on. They are flesh-and-blood men, but almost allegorical in symbolizing the quiet, efficient virility of the Old West.

"Kirk Douglas is wonderfully interesting to photograph," Lang observes. "He has a good face, a strong face. If you get a good angle on him, particularly a low angle, he looks like he is capable of doing anything. And so does Anthony Quinn. They both come through physically strong and strong of purpose. Low angles, shooting up, helped to give them a gutsy look, an extra strength and a heroic quality."

The actors themselves heaped congratulations upon Lang for his work on "Last Train." Privately, he feels that because he made them look important, they felt important and were inspired to do a better job of acting. But the critics agree, and so will audiences everywhere, that this is a superior job of motion picture photography.

scene, during which none his imagination sparks the concept of the pictorial treatment he is about to give it, he will photograph the scene from the camera angle, at the time at day, and possibly through just the right filter that will give it maximum screen impact.

Sometimes his aim is to accentuate reality, at other times he may strive to subordinate reality and give play to fantasy. The subject may call for shooting in slow motion to prolong its action on the screen. From experience, Hunter knows what camera speeds to use to achieve any effect he wishes. More than once he has probed the mysteries of nature with his interval-timer-controlled camera in bringing to the screen fascinating views of plant growth or the evolution of a blossom from bud to flower. "As each subject of this sort invariably has a different growth period, it is necessary first to study the subject to determine the extent of this period so that the camera's interval-timer may be properly set to obtain a sequence of single-frame exposures of the desired duration. In most instances Hunter uses a Dunning intervalometer to operate his camera for single-frame exposure sequences, but there have also been instances where he has made such shots by operating the single-frame release by hand. The intervalometer, he says, makes this type of cinematography easier and the spacing of exposures more accurate."

When shooting general scenes outdoors with color film, he usually determines exposure without the aid of a meter—a proficiency he has acquired during the thirty-five years he has been a photographer. However, Hunter considers a good exposure meter an important tool for every cameraman at least until he develops the knack of evaluating exposure conditions by eye.

Careful preproduction planning is a factor which has helped Hunter achieve the success he has with his films. For instance, to present picturesque Cape Royal, in the Grand Canyon, in a novel and interesting manner, he photographed it at different times during the day in a sequence of shots that revealed its interesting terrain under progressively changing light conditions. To accomplish this, he first studied the scene for a day, observing how sunlight and shadow played upon the Cape and at what times they produced the most

ALL WEATHER CAMERAMAN

Continued From Page 252

spring view of fiery white clouds racing across a windswept sky, heralding an impending storm.

Hunter likes to experiment with effect filters. He will often intensify the mood of a scene or sequence by emphasizing certain colors in nature or by subtly rejecting color not present, using filters singly or in combination.

Hunter believes that the imaginative cinematographer deals primarily with emotion, which he expresses or stimulates pictorially on the screen. Thus, if the subject warrants, he may depart from conventional techniques. For example, he says, a sharp image is not necessarily the best for every scene; often it is a soft, fuzzy image the photographer needs to point up the mood of a scene.

"The movie maker," Hunter says, "draws his emotional experience from the subject matter at hand, and he

must use his creative powers to the fullest in order to bring his impressions to the screen with impact.

"Even though the amateur movie maker has only a few rudimentary pieces of equipment, he is as well prepared as any professional to make useful films that have interest and screen impact. For the success of his work depends not so much upon the scope of his camera—what it can or cannot do—as on what he can accomplish with his equipment."

Hunter's methods are simple. If he observes a particular situation in nature that intrigues him, he studies it carefully for its possible pictorial effect on the screen. Perhaps it is a majestic, white thunderhead boiling over a distant mountain range; a red-hot sea crashing on a shoreline; or a rickety dripping water from granite rocks. After careful appraisal of the

pectorally interesting effects. He then arranged his shooting schedule accordingly.

On the screen the Cape first appears lighted by twilight coming from the side, which accords its interesting modeling. To inject a measure of human interest into the sequence, he photographed the scene later in the day when it was completely front-lighted, and with two men climbing out on a rocky ledge. The contrast of the two figures tended to point up the immensity of the scene. To conclude the sequence, he then pictured the large rock in shadow, with the vast panorama behind it bathed in sunlight, which accentuated that area of the landscape for the first time in the sequence. These dramatically-photographed shots were carefully integrated in the editing so the narrator's description of the changing vista would have maximum impact.

On one of his more productive photographic jaunts, Hunter observed unusual fog conditions around an area of large rock formations. Most photographers would have scoffed at the suggestion that such a scene would make interesting movie material. But Hunter set up his camera, used the intervalometer again, and shot the scene in stop motion as the leftmost of the rocky spires pierced the swirling mist. A less-imaginative cameraman might have passed this scene by because of the old foghorn-influenced weather. For Hunter, the adverse weather made the scene.

Through the years Hunter has tried to break away from conventional cinematography and come up with some thing smothered. He began his career as a still photographer, then turned to 16mm cinematography after he joined Union Pacific Railroad. When Kodachrome film was introduced in 1934, he was one of the first professional 16mm cameramen to visualize its potentials in the field of commercial motion pictures. With color, he found a new outlet for his talents. Today, after producing some fifty travel, educational and promotional films, he still finds new avenues of approach to movie photography. Not all his pictures, of course, are made up of off-beat shots. Unusual sequences are used in a film only when a purpose is served by their inclusion.

Perhaps the two most memorable sequences that have appeared in Hunter's long list of motion picture films are those which show the sea breaking

on the Oregon coast, and dusk enveloping Bryce Canyon.

The first required ten visits to the location where, during a change in the tides the sea foamed over the rugged rocks running the coastline. On the tenth visit Hunter found the sea's performance just right and filmed it dramatically in slow motion.

To give a finishing touch to the sequence, if not to the picture as a whole, Hunter decided he needed one more shot—that of a majestic sunset playing on a tranquil sea in the foreground; so he went out and shot it.

The second of the two memorable sequences mentioned above was that of a scene which Hunter had personally witnessed a number of times but which hitherto had been overlooked by other travel film photographers—the changing pattern of Bryce Canyon during a sunset. On the screen, the colorful vista, filmed in stop motion, undergoes a continuing change in aspect as shadows lengthen until just the tips of distant pinnacles are tinged by the setting sun. As the sky darkens, the full moon grows in brilliance. Finally the scene fades to provide one of the most effective endings Hunter has made for his fascinating and unusual travel films.

HOMEMADE FILM BIN

Continued from Page 153

Fig. 3 shows method of mounting the tubular lenses in the header to furnish the light that is reflected against the film from behind. Two lamps are all that are required and the sockets for same were mounted on a modified "L" bracket. The electric wire enters from the top through a $\frac{3}{8}$ " hole. The wire leading to the switch at the side is tucked to the inside of the bin frame with insulated staples. The bulb sockets were mounted as close as possible in the front of the header board to minimize direct glare from the naked lamps. The top was lined with aluminum foil before mounting; this produces a more even distribution of light. Interior of the shadow box was painted with flat white enamel.

Fig. 4 shows the final operation: unloading the bin liner. The top of the bin was lined with 1-by-2s. Thin slats were then nailed in such a manner that they protruded about an inch above the bin rim.

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the cloth liner. This she made from an old bedsheet, formed it like an open box, with four sides and a rectangular bottom. Dimensions for the liner were about an inch less than those for the box itself. Top of the liner is held in place by stretching it over the bin framework.

Overall dimensions of bin are height, 48 inches; width 22½ inches; and depth, 14 inches. Top of bin is 24 inches from floor. A wooden box of similar size could be substituted, with the film-holding rack and lights added at the top.

GADGET FOR SOUND MIXING

Continued From Page 552

After the device was developed and thoroughly tested, it was put to some very practical uses. One of the intensive uses was a location shooting job which was to be post-synchronized in the studio. A spring-wound camera was adjusted to its near 24 frames a second as possible and the microphone of the recorder placed on a pole boom. Slate and clapperboards were used at the beginning of each scene just as though it were synchronous shooting.

When the work print was obtained, each scene involving lip sync was pulled out and spliced into a loop. Then the film was notched where the clapperboard closed. The sound was cut in the manner previously described using the clapperboard sound as the first sound.

For post-recorded sound, the talent was placed in the recording studio and during the initial playback of the scene, the talent would hear the sound as it was recorded on location. During the second playback the talent would endeavor to speak the lines as they were recorded, while in the control room the tape was rewound to the starting cue. On the third playback, the original sound was played again and this procedure was continued until the talent could read their lines perfectly in sync. At this point the switch was thrown to direct the electrical impulse to a second recorder which was used and pre-set on record and as the talent spoke their lines the voices were automatically recorded in sync with loop. This procedure was followed for all lipsync scenes.

The next step was to edit these scenes into the work print in the proper places. An each scene was laid into the work print, the distance from the be-

ginning of each scene as it would occur in the picture to the notch where the clapperboard closed was accurately measured. Thus a notch could be placed in the work print prior to the scene being laid-in which would coincide with the original distance from the notch at the clapperboard sound to where the scene was being used.

As soon as all scenes were edited properly the work print was notched for all of the recorded sounds including narration, sound effects, and music. The exact location of all notches were entered on the synchronization schedule for sound mixing. The sound mix was accomplished without difficulty by using two ¾ inch tape recorders feeding the various sounds to a 16mm recorder.

Since the development of this electrical tripping mechanism, the author has transferred to Wayne State University's Motion Picture Production Unit. Here the principal of the device is being used for many other purposes. One of the latest uses is automatic cutting of scenes during multiple projection. This is especially useful for showing prints of productions employing multiple camera shooting without manual cutting of the film.

The success and effectiveness of the electrical mechanism has helped to reinforce the author's philosophy that "practical ideas of an uncomplicated nature can help meet today's demands for 16mm film with an economy to coincide with the restrictions often imposed on the small or medium size production unit."

MAGIC-EYE CAMERAS

Continued From Page 557

After extensive practical use of this meter, it was found that stillness were sometimes encountered where a reflected light reading was more practical for a particular scene—for example when shooting out of a window of an airplane in flight. This resulted in further improvement of the meter. It is modified presently a 3-D incident light meter but it could now be converted, when necessary, to also read reflected light. Similar progress is likely to follow in the further development of electric-eye cameras.

As a matter of fact, considerable research and development in this direction has been conducted in my laboratory in recent months, which has culminated in the application of the in-

daylight metering principal to electric-eye exposure control for an ASA cine camera. The prototype camera is pictured in Fig. 1.

For general purposes, this camera has an incident light electric-eye with hemisphere light collector. The hemisphere and associated photocell constitute a sensing device which observes not only the intensity of the incident light but also whether the incident light is front-light, side-light or back-light—each of which has a different weight in illuminating the camera-side of the subject. This provides a high degree of photographic accuracy as well as great versatility. There is also a reflected-light electric eye where in usual conditions are met that require this type of light metering (such as described above). Both electric-eyes are permanently mounted in a tower on top of the camera. Each is correctly oriented with respect to the camera-subject axis. Changeover from one to the other is accomplished simply by pushing a button.

The overall design of the light-metering unit provides benefits of rapid construction and eliminates need for separate accessory devices, such as interchangeable light collectors, etc. No less important is the pre-set control that adjusts the meter for the exposure index of the film used. There is also a latch on the lens iris ring for locking the diaphragm at any desired opening.

To use the camera under typical outdoor conditions, it is first pre-set for the ASA index of the film being used. As outdoor illumination generally is more or less uniform over extended areas, the electric-eye is adjusted for reading incident light. From this point, exposure control is fully automatic. The lens iris will be properly set, regardless whether the scene is front-lighted, side-lighted or back-lighted. Flash tones of foreground subjects will be properly exposed, whether the background is dark, light, or medium bright. Light or tone variations in a scene will not adversely affect such exposures—thanks to the unique incident light collector of the metering device.

Where there are continuing changes in the light level, such as that caused by moving clouds affecting the intensity of the sunlight, the incident light exposure control automatically and accurately responds to such changes and continuously adjusts the lens iris to produce a uniformly well-exposed strip

of film.

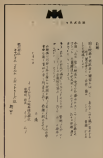
A slightly-different method of operation is followed where subject is in sunlight but the camera is in shade. Here the light falling on the incident-light hemisphere will not be the same as that falling on the subject in sunlight. So the camera is momentarily moved toward the subject until it is in the sun, where the hemisphere will receive and evaluate the same light as that falling on the subject. The lens iris is then locked in place for the opening established by the electric eye, and the camera returned to shooting position in the shade to film the picture.

Where pictures are photographed indoors with artificial illumination, the procedure is to take the camera to subject location in a manner similar to using an incident-light exposure meter. Here the camera exposure controls automatically adjust the lens iris for correct exposure, and the iris is then locked for this exposure by the operator. The camera is then returned to operating position and the scene filmed.

To shoot scenes with this camera in unusual situations, such as out of an airplane window, as previously described, the electric-eye control is shifted from incident to reflected light by means of the selector button. The lens iris now will be controlled by light reflected from the scene—adequate for shots of this type.

Thus, with this dual automatic exposure control, just about any type scene or subject can be photographed with resulting good exposure. The convenience of operation is so extraordinary, it has to be experienced to be appreciated. And since the majority of shots are made on the basis of incident light evaluation by the camera's electric-eye, exposures will have a high order of accuracy—important to those who are relatively critical color films.

Thus, far, the objective has been to provide utmost convenience and exposure accuracy for users of film cameras. But it is not unlikely that some of the principles of this development may very well be adapted to some types of professional motion picture cameras. For instance, such dependable electric-eye exposure control would be a boon in newsreel photography where set-up time invariably is extremely limited, and it could be helpful also as an adjunct to cameras used for many scientific purposes.



For what he said
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CAMERA STABILIZER

Continued From Page 328

tiltation is reduced when the stabilizer is attached to cameras weighing considerably more.

The unit is of all-metal construction and hermetically sealed. Power to actuate the gyro is supplied by a small nickel cadmium battery, usually carried on a shoulder strap. The battery will operate the gyro continuously for a period of approximately two hours.

A series of inverters ranging from six to thirty-two volts are available for operating the Gyro from auto, boat or airplane. A converter is also available for operating it on regular 115-volt house current.

The Kenyon Gyro Head Stabilizer and accessories are distributed exclusively in the western states by Gordon Enterprises, Inc., North Hollywood, Calif.

AURICON CINE-VOICE

Continued From Page 349

camera motor fitted with a 10-foot extension cord. A synchronous motor is optional at extra cost. Both motors take standard 115-volt A.C. house current, or current from a portable power supply. Stopping and starting of motor is by means of a toggle switch at rear of camera.

As the term "single-system sound" implies, the sound track is recorded simultaneously with the picture on the same strip of film, but with the relative sound 26 frames ahead of the corresponding picture. The sound recording apparatus is mounted within the camera case and is virtually an integral part of the camera mechanism.

It consists of the modulating unit or galvanometer, sound track exposure lamp and sound recording sprocket. Threading the camera with film according to the film path inscribed on the inner camera case, prepares the film for both picture and sound exposures.

Augmenting the Cine-Voice II sound camera is the Auricon Cine-Voice amplifier-mixer unit with self-contained batteries. On the sloping panel are two meters: one that indicates the sound track exposure and also affords a check on "A" and "B" battery voltages; the other, a visual sound-recording volume-indicator meter. Also there is a microphone volume-control

knob, sound quality selector switch, and sound track exposure control knob. Conveniently located on top of this unit are the output jack for listening headphones, sound output receptacle, and amplifier microphone input.

The equipment provides for two ranges of sound track exposures: low for ultra-fast negatives that are to be given accelerated processing, which provides exposures from 7 to 11; and high for use with all reversal type films, which provides exposures ranging from 11 to 20.

Portable plug-in type batteries are used to operate the amplifier and also the sound track exposure lamp. These are located in the battery compartment, under the amplifier. The batteries are standard types commonly used in portable radios, etc.

In order to use the Cine-Voice camera in locations where standard 115-volt power is unavailable, a portable power supply unit may be had from Brenco-Bach, Inc. at additional cost. This unit furnishes 115-volt, 60 cycle A.C. power—adequate for any remote camera operation.

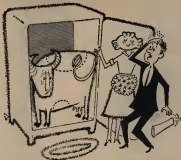
The makers of the Auricon Cine-Voice camera do not recommend that it be re-built or otherwise modified to take overseas film magazines. They point out that the camera's sound recording and film flow mechanisms are balanced for take-up of film in 100-foot reels only, and that any added takeup pull exerted on the sound recording spindlet—which would be necessary where larger than 100-foot spools of film are used—will seriously unbalance the film-flow filter-drive system, and tend to cause inefficient camera operation and poor quality sound recording. Where more than 100-foot film capacity is desired, the company recommends using the Auricon Pro 600 or Super-1200 cameras—both of which will be described in subsequent issues of *American Cinematographer*.

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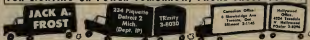
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receptor of the eye responds in a greater or lesser degree to the entire visible spectrum, but is most sensitive to a band of wavelengths which extends over one-third of the spectrum, approximately. There are thus no wavelengths which stimulate just one of the three visual color receptors without stimulating the other two by a slight amount. In other words, there are no pure primary colors!

The color triangle is nevertheless a convenient device. By drawing it as a right triangle on graph paper, two coordinates (usually corresponding to red and green and denoted by the letters x and y) are sufficient to locate any color. The numerical value of the third coordinate (blue, or z) is found by subtracting the sum of the other two from 1, inasmuch as the values red + green + blue (or $x + y + z$) = 1. Complementary colors are located by drawing lines from the colors in question to the opposite sides of the triangle through the arbitrary white, or neutral, point. The additive mixtures of any two colors lie on a straight line connecting the two colors.

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In order to preserve the validity of the handy color triangle in the face of the known deficiencies of the 3-color method of color production, therefore, three imaginary "super-saturated" primaries (X, Y, Z) had to be invented. The spectrum colors (which are the most vivid colors we can see) then form a horseshoe-shaped curve, or locus, when plotted on the color triangle. And since all real colors necessarily lie inside the spectrum locus and the so-called "purple line" which connects its violet and red extremities, only the locus, and not the whole X, Y, Z color triangle, is usually printed in technical discussions of color problems. You will encounter this "CIE chromaticity diagram" (Fig. 3) standardized by the Commission Internationale de l'Eclairage many times in the literature of color motion pictures and television.

Now then, any 3-color reproduction process makes use of three primaries located on or near the spectrum locus, and when these three colors are superimposed by straight lines to form a triangle of mixture colors, it can be seen at once that most of the vivid

spectrum colors (and the non-spectral purples and magentas of maximum saturation) lie somewhat outside the boundaries of the triangle. This is true no matter how carefully we choose our red, green, and blue primaries! A good set of primaries encloses a larger gamut of colors than a poor set, of course; but some of the spectrum colors must lie outside the triangle and represent colors too vivid to be reproduced by the system in full saturation.

Much as we may regret this state of affairs, the color fidelity of 3-color films and TV is not affected too adversely. Very few of the colors encountered in nature even begin to approach the spectrum hues in saturation. It has been found, however, that the most practicable gamut is formed by red, green, and cyan-blue primaries having the wavelengths 700, 525, and 490 millimicrons, respectively (Fig. 4). The "adequateness" of all color motion-picture and TV permits may be reliably judged on the basis of this one.

TO BE CONTINUED

TECHNICAL QUESTIONS AND ANSWERS

Continued from Page 136

simple distortion lens. A similar effect can be produced by placing an anamorphic lens in front of the regular camera lens. The "squeeze" effect can be made horizontal, vertical, or any other angle merely by rotating the anamorphic lens. Still other effects can be produced by using a prism or a combination of simple lenses, which are available from most opticians.

You can also produce unusual distortion effects by photographing objects inside or behind clear jars or tanks filled with water or other liquids.

When cost is not a deterrent, virtually any effect can be created by optical printing. — *Ralph Woolsey, ASC*

Q What source of light is called the "key" light? Also, can you explain, roughly, how direction of photography is about setting up their lights for motion pictures? — *R. A. N., New York*

Answer: The key light is considered the source or main direction of light used to illuminate the principal char-

acters. Key light means source light. It may be strong, or very soft. It may be "hard," simulating sunshine, or soft—as the light reflected on the subject from some adjacent surface. It can be all-enveloping light, such as found in a shaded area.

Set lighting patterns are dictated by the requirements of the scene to be photographed (what it is about; time of day or night). In other words, where should the light come from and what are its visible sources? What is the mood required? These considerations set the pattern for the placement of lights. — *George Foley, ASC*

Q Will use of Eastman reflex finder magnifier cause insufficient brilliancy in finder? I don't like the rectifying this condition by sacrificing depth of field, which would result were the shutter speed reduced. — *S. L. E., Dallas*

Answer: The Eastman reflex magnifier does not diminish brilliancy in the finder. — *Walter Strong, ASC*

DOCUMENTARY FILM TECHNIQUES

WHY, EXACTLY, does the word "documentary" mean? What is it that sets this type of film apart from other types of motion pictures, the newsreels, the training films, the photoplays?

First of all, the documentary film is not merely a "record" film. It goes beyond the plain recording of facts. Rather, its function is to picture and evaluate varied phases of our contemporary social scene—not just the shabby side, but all sides. Unlike the newsreel which presents facts strictly as they happen, the documentary gives behind the scenes, asks "why?", analyzes the factors involved, and usually arrives at a conclusion based on the facts.

Like the newsreel, it is a form of cinematic journalism, but whereas the newsreel resembles an average news item that sketches the facts, the documentary can be compared to a news paper feature article that treats the subject with a much wider scope.

It differs, too, from the training film which tells how to do this or that—also from the photoplay, the main function of which is entertainment. And yet, it has some elements of all three.

The documentary film is not so much like a mirror that reflects life exactly as it is. It is more like a realistic painting that takes the facts, groups them into a forceful composition, and adds the color of its own particular technique, thus clarifying the observer from that are made.

Its function may be historical, educational, or purely informative. But in any case it is a social force to be respected. Like all social forces it can be misused, can become an instrument of class propaganda. It is the responsibility of the documentary film maker to guard against this and to present only the truth as film.

—Herb A. Lichtenau

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PHOTOGRAPHIC ASSIGNMENTS

Continued From Page 328

PARAMOUNT

ALDO TRUITT, "Jenny Holmstrom" (Major Films) shooting in Canada) with Anthony Quinn and Yoko Tani; Nicholas Ray, director.

MARY HAYDEN, "A Breath of Scandal" (Paramount Prod., shooting in Rome) with Sophia Loren and Massimo Vercelli; Michael Curtiz, director.

PARAMOUNT SUNDAY

WALTER STINGER, ASC, "Delicious Tenth" (Paramount Prod., UA release), with Bill Williams and Gloria Talbot; Ed. L. Cahn, director. "Nurse for a Canadian" (Paramount Prod. for UA release) with Jan Davis and Ted De Corda; Ed. L. Cahn, director.

RAY FOSTER, ASC, Commercials*

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GEORGE J. STREETER, ASC, "Deadline" (Paramount Prod.) with Paul Stewart; David Alexander, director.

REPUBLIC STUDIOS

GEORGE BREKST, ASC, "Jane Allston Show" (Four Star Prod.) with Jane Allston; Robert Taylor Desmetz** (Four Star Prod.) with Robert Taylor.

GUY ROE, ASC, GEORGE BREKST, ASC, "Dick Powell's Zane Grey Theatre" (Four Star Prod.) with Dick Powell.

GUY ROE, ASC, "Black Saddle" (Four Star Prod.) with Peter Breck and Russell Johnson.

CHARLES BURKE, "Wishin' Town" (Four Star Prod.) with Joel McCrea; "Johnny Ringo" (Four Star Prod.) with Don Derr and Karen Sharpe.

HOWARD SCHWARTZ, "The Rifleman" (Four Star Prod.) with Chuck Connors and John Crawford.

FRANK BENDIS, "Teachin'head" (Falconer Prod.) with Keweenaw Wynn and Bob Mathias; Robert Altman, director. "Death Valley Days" (Falconer Prod.)

REVUE STUDIOS

BENJAMIN MEYER, ASC, "Spartacus" (Technicolor, Buena Vista) with Kirk Douglas and Laurence Olivier; Anthony Mann, director.

PAUL LATHROP, "The Private Lives of Adam and Eve" (Zagathoff Prod.) with Mickey Rooney and Mamie Van Doren; Albert Zagathoff and Mickey Rooney, directors.

BILL TRACKEY, ASC, WILLIAM SICKNER, "Web Fingers" (Overland Prod.) with Dale Robertson.

MAURICE STENZEL, ASC, "Leave it to Beaver" (Consolidated Prod.) with Barbara Belter and Hugh Brannum; Norma Tokar, director.

BERT KLING, ASC, "Kagor Trust" with Ward Bond (Revue Prod.)

RAY BERNARD, ASC, "Whispering Smith" (Revue Prod.)

LIONEL LONDON, ASC, RAY BERNARD, ASC, "Reverend" (Revue Prod.)

JOHN WARREN, ASC, LARRY LONDON, ASC, RAY CORN, ASC, "Stawicki" (Revue Prod.)

GILBERT WARRINGTON, ASC, WILLIAM SICKNER, ASC, JOHN WARREN, ASC, "M Square" (Revue Prod.)

RAY CORN, ASC, "Bachelor Father" (Bachelor Prod.) with John Tompala.

ELMSTON FREDERICK, ASC, LIONEL LONDON, ASC, "General Electric Theatre" (Revue Prod.)

JOHN RUSSELL, ASC, RAY BERNARD, ASC, "Lansing" (Revue Prod.)

LIONEL LONDON, ASC, JOHN RUSSELL, ASC, RAY CORN, ASC, NEAL RICKMAN, "Markham" (Revue Prod.) with Ray Milland.

JOHN WARREN, ASC, LIONEL LONDON, ASC, JOHN RUSSELL, ASC, "Alfred Hitchcock Presents" (Revue Prod.)

RAY CORN, ASC, JOHN WARREN, ASC, ELLIS TRACKEY, ASC, "Mickey Spillane's Mike Hammer" (Revue Prod.)

SCREEN CLASSICS

CLARK BARNETT, ASC, "Mr. Burke and Her Killer Boud" (Screen Classics Prod.) with Layne Staley; William Cava, director.

TWENTIETH CENTURY-FOX

WILLIAM MELLOR, ASC, "The Best of Everything" (C-Scope & Color, Jerry Wald Prod., shooting in N.Y.) with Hope Lange and Stephen Boyd; Jean Negulesco, director.

ELI LORBER, ASC, "A Journey in the Center of the Earth" (C-Scope & Color) with Pat Boone and James Mason; Henry Levin, director.

OTTO HELLER, "A Day of Freedom" (C-Scope & Color, Robert Ford) shooting in Amsterdam) with David Ladd and Theodore Bikel; James Clack, director.

MELVIN GATSWAN, ASC, "Adventures in Paradise" with Gerdor McKay and Wesley Levy.

LENN SCHWARTZ, ASC, "Beloved Infidel" (C-Scope of Artists Prod.) with Gregory Peck and Deborah Kerr; Henry King, director.

CHARLES CLARKE, ASC, "Hound Dog Man" (C-Scope of Artists Prod.) with Stuart Whitman and Carol Lundy; Dan Sengul, director.

FRANK DUNN, ASC, "The East Side" (C-Scope, APG) with Tommy Noonan and Pete Marshall; George O'Hanlon, director.

WILLIAM DANIEL, ASC, "Car-Cat" (Tech. 40, Jack Cummings Prod.) with Frank Sinatra and Shirley MacLaine; Walter Lang, director.

JOHN STALL, Jr., "The Girl in the Red Robe" (Edw. L. Alperman Prod., C-Scope, shooting in Mexico) with Vicki Steffen and Joanne Dru; Byron Haskin, director.

JOE MACDONALD, ASC, "Fire Fingers" with David Hudson and Luciana Paluzzi.

KARL STERN, ASC, "The Believer" (pilot) Norman Tokar, director.

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JAMES DUNN, Commercials*

RALPH WAGNER, ASC, ROYCE SHERMAN, "The Alphas"

MARK DAVIS, ASC, Commercials*

ROGER SHERMAN, PERRY FREEMAN, "Lawman" with John Russell.

J. FREDERICK MARLEY, ASC, "Chapone" with Clint Walker.

JACK MACKENN, ASC, "Sagittarius" with Will Hutchins.

EDWIN DUFFY, ASC, "Hemlock Eye"

ANTHONY ARZING, ASC, Commercials*

BRIE GLAVIN, "Captains Buffalo" with Jeffrey Hunter and Constance Tovers; John Ford, director.

JOSEPH BRILL, ASC, "St. Patrick" (Shooting in Alaska) with Richard Burton and Robert Ryan; Vincent Sherman, director.

EDWARD CALMAN, ASC, "36-1" (Mark VII) with Jack Webb and William Conrad; Jack Webb, director.

HAROLD BONE, ASC, JACK MACKENN, ASC, "Wendy Anderson, 'Mars'" with Jack Kelly.

CARL GUTBERG, ASC, CARL BING, ASC, "Barlow Street Beat" with Andrea Duggan and Richard Long.

CARL BING, ASC, HAROLD BONE, ASC, "77 Sunset Strip" with Elton Zemelst, Jr.

CARL BING, ASC, WENDY ANDERSON, "Darius" with Ty Hardin.



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is available from the Society in a 20-
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The three components of the sound-
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Rental Catalog

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Camera Selector

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